



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460**

OFFICE OF PREVENTION, PESTICIDES AND TOXIC SUBSTANCES

09-SEP-2003

MEMORANDUM

SUBJECT: Cypermethrin (PC Code 109702) HED Chemistry Chapter of the Reregistration Eligibility Decision (RED): Summary of Product and Residue Chemistry Residue Data. Reregistration Case 2130. DP Barcode D289422.

FROM: William H. Donovan, Ph.D., Chemist
Reregistration Branch 3
Health Effects Division (7509C)

THROUGH: Catherine Eiden, Branch Senior Scientist
Reregistration Branch 3
Health Effects Division (7509C)

TO: Mark Seaton
Reregistration Branch 2
Special Review and Reregistration Division (7508C)

Attached are the product chemistry and residue chemistry considerations for the tolerance reassessment of cypermethrin.

EXECUTIVE SUMMARY:

- Pertinent data requirements have not been satisfied for the Syngenta, FMC, and United Phosphorous technical products. The following additional data are required:
 - (i) for the Syngenta 90% T/TGAI data concerning color, physical state, odor, stability, UV/visible absorption, melting point/boiling point, density, and solubility (OPPTS 830.6302, 6303, 6304, 6313, 7050, 7200/7220, 7300, and 7840); (ii) for the FMC 94% T/TGAI data concerning preliminary analysis (proposed alternate manufacturing site), certified limits, enforcement analytical method, and UV/visible absorption (OPPTS 830.1700, 1750, 1800, and 7050); and (iii) for the United Phosphorous 96.7% T/TGAI data concerning stability and solubility (OPPTS 830.6313 and 7840). The Control Solutions and Valent BioSciences technical products are repackaged from EPA-registered products; therefore, product chemistry data requirements will be fulfilled by data for the source products. Provided that the registrants submit the data required in the attached data summary tables for the T/TGAIs and either certify that the suppliers of beginning materials and the manufacturing processes for the cypermethrin technical products have not changed since the last comprehensive product chemistry review or submit complete updated product chemistry data packages, HED has no objections to the reregistration of cypermethrin with respect to product chemistry data requirements.
- Field residue data should be submitted for cotton gin byproducts and a tolerance should be proposed for this commodity when adequate field residue data have been submitted and evaluated.
- All cypermethrin and zeta-cypermethrin labels pertaining to agricultural crops should contain the following restriction: “do not apply cypermethrin products to crops that have been treated with zeta-cypermethrin or vice versa.”
- Other needed label changes pertain to the following: 1) minimum retreatment intervals, 2) minimum aerial application volumes, and 3) impractical cotton forage grazing/feeding restrictions.

CYPERMETHRIN
PC Code 109702; Case 2130

Reregistration Eligibility Decision:
Product Chemistry Considerations

June 11, 2003

Contract No. 68-W-99-053

Submitted to:
U.S. Environmental Protection Agency
Arlington, VA

Submitted by:
Dynamac Corporation
20440 Century Blvd, Suite 100
Germantown, MD 20874

CYPERMETHRIN

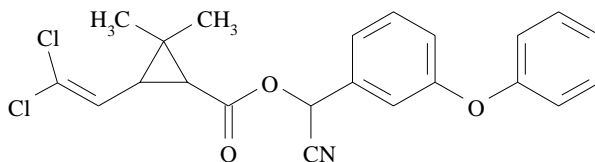
REREGISTRATION ELIGIBILITY DECISION:

PRODUCT CHEMISTRY CONSIDERATIONS

PC Code 109702; Case No. 2130

DESCRIPTION OF CHEMICAL

Cypermethrin [(±)-alpha-cyano-(3-phenoxyphenyl)methyl [(±)-*cis, trans*-3(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate]] is a synthetic pyrethroid insecticide used on cotton, vegetables, animals, food/feed establishments, buildings and structures, and ornamentals. As cypermethrin has three asymmetric carbons, it is comprised of eight stereoisomers with percentage compositions ranging from 11-14% each. Zeta-cypermethrin is a combination of the same 8 isomers with 4 insecticidally less active ones at a concentration of 1% each. The remaining 4 isomers, two of which are regarded as being the most insecticidally active, are present at a concentration of 24% each.



Empirical Formula:	C ₂₂ H ₁₉ Cl ₂ NO ₃
Molecular Weight:	416.30
CAS Registry No.:	52315-07-8
PC Code:	109702

IDENTIFICATION OF ACTIVE INGREDIENT

Technical cypermethrin is a dark red or yellow-brown viscous liquid with a melting point of 68-80 C and boiling point of 254 C, density of 1.2 g/mL, octanol/water partition coefficient of 10²-10³, and vapor pressure of 3.1 x 10⁻⁹ mm Hg at 25 C. Cypermethrin is virtually insoluble in water (<0.01 mg/L), but is soluble in methanol, acetone, acetonitrile, toluene, xylene, and methylene dichloride. Cypermethrin is not miscible with hexane.

MANUFACTURING-USE PRODUCTS

A search of the Reference Files System (REFS) conducted 3/13/03 identified seven cypermethrin manufacturing-use products (MPs) registered under PC Code 109702; a list of the registered MPs is presented in Table 1. Cypermethrin is a List B reregistration chemical; therefore, only the T/TGAIs are subject to a reregistration eligibility decision.

Table 1. Registered manufacturing-use products of Cypermethrin (Case 2130).

Product ¹	EPA Reg. No.	Registrant	Comments/Transfers
90% T	100-989	Syngenta Crop Protection, Inc.	Formerly Zeneca AG Products, Inc.; transferred 2/23/01 from EPA Reg. No. 10182-68. REFS should be updated to reflect the product concentration of 90% represented on the label and CSF instead of 88%.
70% FI	100-1018		Formerly Zeneca AG Products, Inc.; transferred 2/23/01 from EPA Reg. No. 10182-140. Formulated from an EPA- registered technical product; only T/TGAIs are subject to a reregistration eligibility decision.
94% T	279-3026	FMC Corporation, Agricultural Products Group	REFS should be updated to reflect the product concentration of 94% represented on the CSF instead of 88%.
96.7% T (r)	53883-89	Control Solutions, Inc.	
96.7% T	70506-10	United Phosphorous, Inc.	
90% T (r)	73049-385	Valent BioSciences Corporation	Transferred 1/9/02 from Bayer Environmental Science, EPA Reg. No. 432-1214. REFS should be updated to identify this as a technical product instead of a formulation intermediate.
90% T (r)	73049-386		Transferred 4/5/02 from AgrEvo Environmental Health, EPA Reg. No. 432-725. REFS should be updated to identify this product as a technical product instead of a formulation intermediate and to reflect the product concentration of 90% based on the source product instead of 88%.

¹ (r) = Repackaged product.

FMC Corporation is in the process of registering zeta- or S-cypermethrin, which is the resolved active isomer of RS-cypermethrin. Because the active isomer is enhanced and no longer a racemic mixture, S-cypermethrin is considered to be a new pesticide active ingredient (PC Code 129064). HED has determined that physical/chemical characteristics of zeta-cypermethrin and cypermethrin are the same; however, zeta-cypermethrin is considered to be a new product registration and does not fall under the cypermethrin reregistration eligibility decision.

REGULATORY BACKGROUND

The Cypermethrin Phase 4 Review dated 2/11/91 for ICI Americas and FMC Corporation required additional product chemistry data for all Guidelines except 61-1. Data submitted subsequent to the Phase 4 Review have been reviewed by the Agency.

The current status of the product chemistry data requirements for the cypermethrin T/TGAI is presented in the attached data summary tables. Refer to these tables for a listing of the outstanding product chemistry data requirements.

CONCLUSIONS

Pertinent data requirements have not been satisfied for the Syngenta, FMC, and United Phosphorous technical products. The following additional data are required: (i) for the Syngenta 90% T/TGAI data concerning color, physical state, odor, stability, UV/visible absorption, melting point/boiling point, density, and solubility (OPPTS 830.6302, 6303, 6304, 6313, 7050, 7200/7220, 7300, and 7840); (ii) for the FMC 94% T/TGAI data concerning preliminary analysis (proposed alternate manufacturing site), certified limits, enforcement analytical method, and UV/visible absorption (OPPTS 830.1700, 1750, 1800, and 7050); and (iii) for the United Phosphorous 96.7% T/TGAI data concerning stability and solubility (OPPTS 830.6313 and 7840). The Control Solutions and Valent BioSciences technical products are repackaged from EPA-registered products; therefore, product chemistry data requirements will be fulfilled by data for the source products. Provided that the registrants submit the data required in the attached data summary tables for the T/TGAIs and either certify that the suppliers of beginning materials and the manufacturing processes for the cypermethrin technical products have not changed since the last comprehensive product chemistry review or submit complete updated product chemistry data packages, HED has no objections to the reregistration of cypermethrin with respect to product chemistry data requirements.

Case No. 2130
Chemical No. 109702

Case Name: Cypermethrin
Registrant: Syngenta Crop Protection, Inc.
Product(s): 90% T (EPA Reg. No. 100-989)

PRODUCT CHEMISTRY DATA SUMMARY

Guideline Number	Requirement	Are Data Requirements Fulfilled? ¹	MRID Number ²
830.1550	Product identity and composition	Y	42043801 , CSF 9/26/91 ³
830.1600	Description of materials used to produce the product	Y	42068501 , 42854301 ⁴
830.1620	Description of production process	Y	42068501
830.1670	Discussion of formation of impurities	Y	42068501
830.1700	Preliminary analysis	Y	42043801
830.1750	Certified limits	Y	42043801 , CSF 9/26/91 ³
830.1800	Enforcement analytical method	Y	42043801
830.6302	Color	N ⁵	
830.6303	Physical state	N ⁵	
830.6304	Odor	N ⁵	
830.6313	Stability to normal and elevated temperatures, metals, and metal ions	N ⁵	
830.7000	pH	N/A ⁶	
830.7050	UV/Visible absorption	N ⁷	
830.7200	Melting point/melting range	N ⁵	
830.7220	Boiling point/boiling range	N ⁵	
830.7300	Density/relative density/bulk density	N ⁵	
830.7370	Dissociation constants in water	Y	41887003 ⁸ , 42650601 ⁹
830.7550	Partition coefficient (n-octanol/water), shake flask method	Y	41887003 ⁸
830.7840	Water solubility: column elution method; shake flask method	N ⁵	
830.7950	Vapor pressure	Y	41887003 ⁸

¹ Y = Yes; N = No; N/A = Not Applicable. The Syngenta 90% T was transferred from Zeneca Ag Products (EPA Reg. No. 10182-68). A letter located in the product jacket confirms that Syngenta (formerly Zeneca) may use FMC data to fulfill data requirements; however, because the Syngenta and FMC technical products contain different impurity levels, only PAI data apply.

² **Bolded** references were reviewed under D183295 and D183294, 2/4/93, D. McNeilly; and all other references were reviewed as noted.

³ RD Memorandum, D225261, 4/25/96, S. Mathur.

⁴ Under review.

⁵ The Phase 4 Review dated 2/11/91 indicates that the registrant has committed to conduct a new study addressing this data requirement.

⁶ Data are not required because the TGAI is not soluble in water.

⁷ The OPPTS Series 830, Product Properties Test Guidelines require data pertaining to UV/visible absorption for the PAI.

⁸ D166724, 9/2/92, C. Olinger (PAI data for the FMC 94% T, EPA Reg. No. 279-3026).

⁹ Under review (PAI data for the FMC 94% T, EPA Reg. No. 279-3026).

Case No. 2130
Chemical No. 109702

Case Name: Cypermethrin
Registrant: FMC Corporation
Product(s): 94% T (EPA Reg. No. 279-3026)

PRODUCT CHEMISTRY DATA SUMMARY

Guideline Number	Requirement	Are Data Requirements Fulfilled? ¹	MRID Number ²
830.1550	Product identity and composition	Y	00081566, 00086966, 00090032, 00097865, 00097866, 00097868, 00097869, 00102991, 00115281, 00133028, 00161909, 40513301, CSF 9/25/02 ³
830.1600	Description of materials used to produce the product	Y ⁴	41887001 ⁵
830.1620	Description of production process	Y ⁴	41887001 ⁵
830.1670	Discussion of formation of impurities	Y	41887001 ⁵
830.1700	Preliminary analysis	N ⁶	41887001 ⁵ , 45850201 ⁷
830.1750	Certified limits	N ⁸	41887001 ⁵ , 41887002 ⁵ , CSF 9/25/02 ³
830.1800	Enforcement analytical method	N ⁹	41887002 ⁵
830.6302	Color	Y	41887003 ⁵
830.6303	Physical state	Y	41887003 ⁵
830.6304	Odor	Y	41887003 ⁵
830.6313	Stability to normal and elevated temperatures, metals, and metal ions	Y	41887003 ⁵ , 42868201 ⁷ , 42868202 ⁷
830.7000	pH	Y	41887003 ⁵
830.7050	UV/Visible absorption	N ¹⁰	
830.7200	Melting point/melting range	N/A ¹¹	
830.7220	Boiling point/boiling range	Y	42868201 ⁷ , 42868202 ⁷
830.7300	Density/relative density/bulk density	Y	41887003 ⁵
830.7370	Dissociation constants in water	Y	41887003 ⁵ , 42650601 ⁷
830.7550	Partition coefficient (n-octanol/water), shake flask method	Y	41887003 ⁵
830.7840	Water solubility: column elution method; shake flask method	Y	41887003 ⁵
830.7950	Vapor pressure	Y	41887003 ⁵

¹ Y = Yes; N = No; N/A = Not Applicable.

² **Bolded** references were reviewed in the Cypermethrin Phase 4 Review, 2/11/91, C. Olinger; and all other references were reviewed as noted.

³ RD D285776, 10/29/02, L. Kutney, and Letter dated 12/10/02 from G. LaRocca, RD.

⁴ If alternate steps discussed in the production process are employed, then an alternate formulation must be registered and additional product chemistry data may be required.

⁵ D166724, 9/2/92, C. Olinger. We note that relevant data gaps have been updated to reflect the current CSF.

⁶ Acceptable data were previously submitted for the basic formulation; however, new data were submitted for an alternate production site. The registrant must submit data confirming that levels of one impurity have been reduced to <1.0% in the cypermethrin produced at the alternate production site before HED will approve designation of the product as an alternate formulation.

⁷ Under review.

⁸ Certified limits for many impurities listed on the CSF are much higher than the results of preliminary analysis would appear to warrant and require further explanation. The registrant must also explain the presence on the CSF and the basis for establishment of certified limits for two compounds which were present at nondetectable or very low levels in the preliminary analysis. Based on the submitted manufacturing process, the registrant must specify the formulation (basic or alternate) these data are intended to support.

⁹ Adequate validation data must be submitted in support of the methods used to determine the active ingredient and impurities, and analytical methods must be specified for two impurities which were present at very low levels in the preliminary analysis but were included on the CSF.

¹⁰ The OPPTS Series 830, Product Properties Test Guidelines require data pertaining to UV/visible absorption for the PAI.

¹¹ Data are not required because the TGAI is a liquid at room temperature.

Case No. 2130
Chemical No. 109702

Case Name: Cypermethrin
Registrant: Control Solutions, Inc.
Product(s): 96.7% T (EPA Reg. No. 53883-89)

PRODUCT CHEMISTRY DATA SUMMARY

Guideline Number	Requirement	Are Data Requirements Fulfilled? ¹	MRID Number ²
830.1550	Product identity and composition	Y	CSF 8/6/02
830.1600	Description of materials used to produce the product	N/A	
830.1620	Description of production process	N/A	
830.1670	Discussion of formation of impurities	N/A	
830.1700	Preliminary analysis	N/A	
830.1750	Certified limits	Y	CSF 8/6/02
830.1800	Enforcement analytical method	N/A	
830.6302	Color	N/A	
830.6303	Physical state	N/A	
830.6304	Odor	N/A	
830.6313	Stability to normal and elevated temperatures, metals, and metal ions	N/A	
830.7000	pH	N/A	
830.7050	UV/Visible absorption	N/A	
830.7200	Melting point/melting range	N/A	
830.7220	Boiling point/boiling range	N/A	
830.7300	Density/relative density/bulk density	N/A	
830.7370	Dissociation constants in water	N/A	
830.7550	Partition coefficient (n-octanol/water), shake flask method	N/A	
830.7840	Water solubility: column elution method; shake flask method	N/A	
830.7950	Vapor pressure	N/A	

¹ Y = Yes; N = No; N/A = Not Applicable. This product is repackaged from an EPA-registered product; all product chemistry data requirements will be fulfilled by data for the source product.

² The CSF was obtained from the product jacket.

Case No. 2130
Chemical No. 109702

Case Name: Cypermethrin
Registrant: United Phosphorous, Inc.
Product(s): 96.7% T (EPA Reg. No. 70506-10)

PRODUCT CHEMISTRY DATA SUMMARY

Guideline Number	Requirement	Are Data Requirements Fulfilled? ¹	MRID Number ²
830.1550	Product identity and composition	Y	45462101, CSF 12/18/00
830.1600	Description of materials used to produce the product	Y	45462101
830.1620	Description of production process	Y	45462101
830.1670	Discussion of formation of impurities	Y	45462101
830.1700	Preliminary analysis	Y	45462101
830.1750	Certified limits	Y	45462101, CSF 12/18/00
830.1800	Enforcement analytical method	Y	45462101
830.6302	Color	Y	45474201
830.6303	Physical state	Y	45474201
830.6304	Odor	Y	45474201
830.6313	Stability to normal and elevated temperatures, metals, and metal ions	N ³	45474201 , Letter 12/4/01 ⁴
830.7000	pH	Y	45474201
830.7050	UV/Visible absorption	Y	45474201
830.7200	Melting point/melting range	N/A ⁵	
830.7220	Boiling point/boiling range	Y	45474201
830.7300	Density/relative density/bulk density	Y	45474201
830.7370	Dissociation constants in water	Y	45474201
830.7550	Partition coefficient (n-octanol/water), shake flask method	Y	41887003 ⁶
830.7840	Water solubility: column elution method; shake flask method	N ⁷	45474201
830.7950	Vapor pressure	Y	41887003 ⁶

¹ Y = Yes; N = No; N/A = Not Applicable.

² **Bolded** references were reviewed by the Registration Division, D277093, 10/31/01, S. Mathur; all other references were reviewed as noted.

³ Additional data are required pertaining to the stability of the TGAI at normal and elevated temperatures and on exposure to metals and metal ions.

⁴ RD, D280344, 4/23/02, S. Mathur

⁵ Data are not required because the TGAI is a liquid at room temperature.

⁶ D166724, 9/2/92, C. Olinger (PAI data for the FMC 94% T, EPA Reg. No. 279-3026); under D280344, the Agency permitted the registrant to cite FMC data for these requirements.

⁷ Data pertaining to solubility in solvents other than water are required.

Case No. 2130

Chemical No. 109702

Case Name: Cypermethrin

Registrant: Valent BioSciences Corporation

Product(s): 90% T (EPA Reg. No. 73049-385)

PRODUCT CHEMISTRY DATA SUMMARY

Guideline Number	Requirement	Are Data Requirements Fulfilled? ¹	MRID Number ²
830.1550	Product identity and composition	Y ³	CSF 5/4/00
830.1600	Description of materials used to produce the product	N/A	
830.1620	Description of production process	N/A	
830.1670	Discussion of formation of impurities	N/A	
830.1700	Preliminary analysis	N/A	CSF 5/4/00
830.1750	Certified limits	Y ³	
830.1800	Enforcement analytical method	N/A	
830.6302	Color	N/A	
830.6303	Physical state	N/A	
830.6304	Odor	N/A	
830.6313	Stability to normal and elevated temperatures, metals, and metal ions	N/A	
830.7000	pH	N/A	
830.7050	UV/Visible absorption	N/A	
830.7200	Melting point/melting range	N/A	
830.7220	Boiling point/boiling range	N/A	
830.7300	Density/relative density/bulk density	N/A	
830.7370	Dissociation constants in water	N/A	
830.7550	Partition coefficient (n-octanol/water), shake flask method	N/A	
830.7840	Water solubility: column elution method; shake flask method	N/A	
830.7950	Vapor pressure	N/A	

¹ Y = Yes; N = No; N/A = Not Applicable. The Valent (formerly Aventis) 90% T is repackaged from an EPA-registered product; therefore, product chemistry data requirements will be fulfilled by data for the source product.

² The CSF was obtained from the product jacket.

³ The CSF must be revised to reflect the nominal concentration and certified limits of the active ingredient based on the actual amount of the active ingredient in the product. In addition, the EPA Reg. No. of the product, the name of the current registrant, and the EPA Reg. No. of the source product must be updated.

Case No. 2130
Chemical No. 109702

Case Name: Cypermethrin
Registrant: Valent BioSciences Corporation
Product(s): 90% T (EPA Reg. No. 73049-386)

PRODUCT CHEMISTRY DATA SUMMARY

Guideline Number	Requirement	Are Data Requirements Fulfilled? ¹	MRID Number ²
830.1550	Product identity and composition	Y ³	CSF 8/26/86
830.1600	Description of materials used to produce the product	N/A	
830.1620	Description of production process	N/A	
830.1670	Discussion of formation of impurities	N/A	
830.1700	Preliminary analysis	N/A	CSF 8/26/86
830.1750	Certified limits	Y ³	
830.1800	Enforcement analytical method	N/A	
830.6302	Color	N/A	
830.6303	Physical state	N/A	
830.6304	Odor	N/A	
830.6313	Stability to normal and elevated temperatures, metals, and metal ions	N/A	
830.7000	pH	N/A	
830.7050	UV/Visible absorption	N/A	
830.7200	Melting point/melting range	N/A	
830.7220	Boiling point/boiling range	N/A	
830.7300	Density/relative density/bulk density	N/A	
830.7370	Dissociation constants in water	N/A	
830.7550	Partition coefficient (n-octanol/water), shake flask method	N/A	
830.7840	Water solubility: column elution method; shake flask method	N/A	
830.7950	Vapor pressure	N/A	

¹ Y = Yes; N = No; N/A = Not Applicable. The Valent (formerly Aventis) 90% T is repackaged from an EPA-registered product; therefore, product chemistry data requirements will be fulfilled by data for the source product.

² The CSF was obtained from the product jacket.

³ The CSF must be revised to reflect the nominal concentration and certified limits of the active ingredient based on the actual amount of the active ingredient in the product. In addition, the EPA Reg. No. of the product, the name of the current registrant, and the EPA Reg. No. of the source product must be updated. We further note that the nominal concentration of the source product has been increased; therefore, the label claim of the repackaged product must be revised.

AGENCY MEMORANDA CITED IN THIS DOCUMENT

DP Barcode(s): D166724
Subject: FMC Response to the Phase IV DCI: Product Chemistry Data; Chemical No. 109702.
From: C. Olinger
To: V. Dutch
Dated: 9/2/92
MRID(s): 41887001 through 41887003

DP Barcode(s): D183295 and D183294
Subject: Cypermethrin; Product Chemistry Data.
From: D. McNeilly
To: V. Dutch
Dated: 2/4/93
MRID(s): 42043801 and 42068501

DP Barcode(s): RD Memorandum; D225261
Subject: Product Chemistry Review; Reg./File Symbol No. 10182-68; Product Name: Cypermethrin Technical; Company: Zeneca Ag Products.
From: S. Mathur
To: G. LaRocca
Dated: 4/25/96
MRID(s): None

DP Barcode(s): RD Memorandum; D277093
Subject: Product Chemistry Review of Cypermethrin Technical Insecticide.
From: S. Mathur
To: A. Layne
Dated: 10/31/01
MRID(s): 45462101, 45462102, and 45474201

DP Barcode(s): RD Memorandum; D280344
Subject: Product Chemistry Review of TGAI/MP; Reg./File Symbol No. 70506-RN; Product Name: Cypermethrin Technical Insecticide; Company: United Phosphorous Incorporation.
From: S. Mathur
To: A. Layne
Dated: 4/23/02

MRID(s): None

DP Barcode(s): RD Memorandum; D285776
Subject: Product Chemistry Review; Reg./File Symbol No.: 279-3026; Product Name: Ammo Technical Insecticide.
From: L. Kutney
To: A. Layne, L. DeLuise and P. Dobak
Dated: 10/29/02
MRID(s): None

DP Barcode(s):
Subject: Product Chemistry Review for Zeneca Ag Products 90% T (transferred to Syngenta Crop Protection, EPA Reg. No. 100-989).
From:
To:
Dated: Under Review
MRID(s): 42854301

DP Barcode(s):
Subject: Product Chemistry Review for FMC Corp. 94% T, EPA Reg. No. 279-3026.
From:
To:
Dated: Under Review
MRID(s): 42650601, 42868201, 42868202, and 45850201

PRODUCT CHEMISTRY CITATIONS

Bibliographic citations include only MRIDs containing data which fulfill data requirements.

References (cited):

00081566 Eitelman, S.J.; Cheplen, J.M. (1981) Characterization of Typical Cypermethrin Technical Manufactured by ICI Americas Inc.: Report Series TMU0557/C. (Unpublished study received Sep 10, 1981 under 10182-EX-19; submitted by ICI Americas, Inc., Wilmington, Del.; CDL:070289-B)

00086966 ICI Americas, Incorporated (1981) Confidential Statement of Formula: Cymbush 3E. (Unpublished study received Nov 5, 1981 under 10182-EX-25; CDL:246211-A)

00090032 ICI Americas, Incorporated (1981) Manufacturing Process. (Unpublished study received Dec 30, 1981 under 10182-64; CDL:070563-D)

00097865 ICI Americas, Incorporated (1981) [Composition and Manufacturing Process of Cymbush® Insecticide]. (Unpublished study received Dec 30, 1981 under 10182-64; CDL:070556-F)

00097866 ICI Americas, Incorporated (1981) Confidential Statement of Formula: Cymbush 3E. (Unpublished study received Dec 30, 1981 under 10182-64; CDL:070556-G)

00097868 ICI Americas, Incorporated (1981) [Cypermethrin: Composition and Manufacturing Process]. (Unpublished study received Dec 30, 1981 under 10182-64; CDL:070557-D)

00097869 ICI Americas, Incorporated (1981) Confidential Statement of Formula: Cymbush 2E (JF 6670). (Unpublished study received Dec 30, 1981 under 10182-64; CDL:070557-E)

00102991 ICI Americas, Inc. (1980) [Cypermethrin: Chemical Study]. (Compilation; unpublished study received May 20, 1982 under 10182-68; CDL:247563-A)

00115281 FMC Corp. (1982) Product Chemistry: [Ammo Technical and Ammo 2.5 EC Formulation]. (Compilation; unpublished study received Oct 1, 1982 under 279-3026; CDL:248522-A)

00133028 FMC Corp. (1983) Product Chemistry: [Ammo]. (Compilation; unpublished study received Dec 20, 1983 under 279-3027; CDL:252014-A)

00161909 FMC Corp. (1984) Product Chemistry for Ammo 2.5 Oil, Ammo 2.5 EC, and Ammo Technical. Unpublished compilation. 28 p.

40513301 Ierley, D. (1988) Product Chemistry Data Summary: Cymbush 2E Insecticide. Unpublished compilation prepared by ICI Americas, Inc. 13 p.

41887001 Smeltz, L. (1991) Cypermethrin: Product Identity and Disclosure of Ingredients; Description of Starting Materials and Manufacturing Process; Discussion of the Formation of Impurities: Lab Project Number: 191D61P90-1: P-2572. Unpublished study prepared by FMC Corp. 121 p.

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41887003 Alvarez, M. (1991) Cypermethrin: Physical Properties of Cypermethrin: Lab Project Number: P-2594: 191AF90195. Unpublished study prepared by FMC Corp. 50 p.

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CYPERMETHRIN
PC Code 109702; Case No. 2130

Reregistration Eligibility Decision:
Residue Chemistry Considerations

May 29, 2000

Contract No. 68-W-99-053

Submitted to:
U.S. Environmental Protection Agency
Arlington, VA

Submitted by:
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CYPERMETHRIN

REREGISTRATION ELIGIBILITY DECISION

RESIDUE CHEMISTRY CONSIDERATIONS

PC Code 109702; Case No. 2130

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CYPERMETHRIN

REREGISTRATION ELIGIBILITY DECISION

RESIDUE CHEMISTRY CONSIDERATIONS

PC Code 109702; Case No. 2130

INTRODUCTION

Cypermethrin [(±)-alpha-3-cyano-(3-phenoxyphenyl)methyl [(±)-*cis, trans*-3(2,2-dichloro-ethenyl)-2,2-dimethylcyclopropanecarboxylate]] is a stomach and contact insecticide belonging to the pyrethroid family of pesticides. Cypermethrin is registered for foliar applications to control a wide range of pests, particularly lepidoptera, on food/feed crops including leafy Brassica greens and head and stem Brassica crop subgroups, cotton, garlic, lettuce (head), onions (dry bulb & green), pecans, and shallots using ground, sprinkler irrigation, or aerial equipment. Cypermethrin is additionally registered for indoor applications (e.g., spot or crack and crevice treatments) to commercial food-handling establishments using brush or spray equipment. The single active ingredient formulations of cypermethrin include the emulsifiable concentrate (EC), the soluble concentrate/liquid (SC/L), and the wettable powder (WP). Cypermethrin is compatible with a number of insecticides and fungicides. Cypermethrin is classified as a restricted-use pesticide (RUP) for some of its applications.

REGULATORY BACKGROUND

The Cypermethrin Phase 4 Review was issued 2/11/91. A Data-Call-In (DCI) Notice was issued 7/1/91 requiring the registrants to submit several residue chemistry studies for cypermethrin in order to fulfill reregistration requirements. The basic producers, FMC Corporation and Zeneca Ag Products (formerly ICI Americas), have submitted several of the studies requested in the DCI, and the majority of these studies have undergone Phase 5 Review. The data requirements for a few studies still remain unfulfilled. The Residue Chemistry Chapter for the Cypermethrin Reregistration Eligibility Decision (RED) Document was completed on 9/12/96. This document represents a revision of the RED Chapter, and summarizes the current Residue Chemistry Science Assessments with respect to the reregistration of cypermethrin.

Permanent tolerances expressed in terms of the residues cypermethrin *per se* are established under 40 CFR §180.418(a)(1) for pecans (0.05 ppm); bulb onions (0.10 ppm); cottonseed (0.5 ppm); head and stem brassica (2.0 ppm); green onions (6.0 ppm); head lettuce (10.0 ppm); leafy brassica (14.0 ppm); and for the milk, fat, meat, and meat byproducts of cattle, goats, hogs, horses, and sheep (each at 0.05 ppm). No tolerances have been established for processed crop commodities. Adequate methods are available for the enforcement of established tolerances.

FMC Corporation has registered zeta- or S-cypermethrin, which is the resolved active isomer of RS-cypermethrin. Since the active isomer is enhanced and no longer a racemic mixture, S-cypermethrin is considered a new pesticide active ingredient (PC Code 129064). Tolerances for residues of zeta-cypermethrin (S-cyano(3-phenoxyphenyl)methyl [(±)-*cis*, *trans*-3(2,2-dichloroethenyl)-2,2-dimethylcyclopropane- carboxylate) and its inactive R-isomers have been established under 40 CFR §180.418(a)(2) for a wide variety of crops.

Additional cypermethrin residue data are now required for cotton gin byproducts as a result of changes to OPPTS.GLN 860.1000, Table 1 (8/96). The new data requirement was imposed at the issuance of the Cypermethrin RED (9/96), but will not impinge on the current reregistration eligibility decisions for cypermethrin. The appropriate tolerance level for cotton gin byproducts and the need for any revisions to dietary exposure/risk assessments will be determined upon receipt of the required residue chemistry data.

SUMMARY OF SCIENCE FINDINGS

OPPTS.GLN 860.1200: Directions for Use

A REFS search conducted 2/9/00 identified 14 cypermethrin end-use products (EPs) registered to FMC Corporation and Syngenta Crop Protection, Inc., under FIFRA Section 3, and five active SLNs registered under FIFRA Section 24(c) for use on food/feed crops. A list of cypermethrin EPs is presented in the table below. A comprehensive summary of registered food/feed use patterns for cypermethrin, based on the products registered to the basic producers and all active SLN registrations is presented in Table A. For the purposes of reregistration, label amendments are required for cypermethrin EPs with use claims on garlic, lettuce, onions, and pecans to specify minimum retreatment intervals. In addition, several product labels allow application in less than 2 gal/A when using aerial equipment. Unless the registrants submit field residue data to support aerial applications in <2 gal/A, the product labels must be amended to specify that aerial applications be made in a minimum of 2 gal/A. Finally, all cypermethrin and zeta-cypermethrin labels pertaining to agricultural crops should contain the following restriction: “do not apply cypermethrin products to crops that have been treated with zeta-cypermethrin or vice versa.”

Non-food uses: Cypermethrin is registered under FIFRA Section 24(c) for use on Bermuda grass grown for seed (AZ840006 and CA840214), clover grown for seed (CA850044), and dry bulb onion grown for seed (AZ930009). The labels for these SLNs specify that the grazing or feeding of treated foliage, crop residue, or seed millings is prohibited. HED has examined the product labels for these SLN uses and concluded that these are non-food/feed uses based on the application timing and accompanying label restrictions. Therefore, field trial data are not required to support these uses.

The registrants have appropriately amended their labels, as requested in the Phase 4 Review, to clarify cypermethrin uses in greenhouses and warehouses where raw or cured tobacco may be stored. Because cypermethrin uses in greenhouses are now limited to ornamental plants, no data

depicting the magnitude of the residue in/on food/feed crops grown under greenhouse conditions are required. Furthermore, because label directions for use of cypermethrin in warehouses explicitly prohibit applications when raw or cured tobacco is stored, residue data for tobacco stored in warehouses are no longer required.

Cypermethrin end-use products (EPs) with food/feed uses registered to FMC Corporation and Syngenta Crop Protection, Inc.

Registrant	Acceptance	Formulation		Product Name
EPA Reg. No.	Date	Class		
FMC Corporation				
279-3027 ^a	3/99	2.5 lb/gal EC		Ammo® 2.5 EC Insecticide
279-3044	6/95	2.5 lb/gal SC/L		Ammo® 2.5 Oil Insecticide
279-3046	6/95	2.5 lb/gal EC		Ammo® 2.5 Miscible Insecticide
279-3070	9/96	40% WP		Cynoff® WP Insecticide
279-3081	9/96	2 lb/gal EC		Cynoff® EC Insecticide
279-3082	5/98	2 lb/gal EC		Prevail® FT Termiticide
279-3084	10/96	38.7% WP		Ammo® WSB Insecticide
279-3085	9/96	35.6% WP	Cynoff® WSB Insecticide in Water Soluble Bags	
279-3109	9/96	50% WP		Cynoff® 50 WP Insecticide
279-3117	9/96	50% WP		Cynoff® 50 WSB Insecticide
279-3120	8/95	2.5 lb/gal EC		Cynoff® 2.5 EW Insecticide
Syngenta Crop Protection Inc.				
100-71	9/97	40% WP		Demon® WP Insecticide
100-100	2/98	35.6% WP	Demon® WP Insecticide in Water Soluble Packets	
100-105	9/97	2 lb/gal EC		Demon® EC Insecticide

^a Including SLN Nos. AL940008, AZ930009, LA940002, MS940004, and NM860002.

A tabular summary of the residue chemistry science assessments for reregistration of cypermethrin is presented in Table B. The conclusions listed in Table B regarding the reregistration eligibility of cypermethrin food/feed uses are based on the use patterns registered by the basic producers, FMC and Syngenta. When end-use product DCIs are developed (e.g., at issuance of the RED), RD should require that all end-use product labels (e.g., MAI labels, SLNs, and products subject to the generic data exemption) be amended such that they are consistent with the basic producer labels.

Table A. Food/Feed Use Patterns Subject to Reregistration for Cypermethrin (Case No. 2130).

Site Application Type Application Timing Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Appl. Rate (ai)	Maximum Number of Applications	Minimum Retreatment Interval (Days)	Use Limitations ¹
Cotton					
Foliar broadcast application Ground, sprinkler irrigation, or aerial equipment	2.5 lb/gal EC [279-3027] [279-3046] 2.5 lb/gal SC/L [279-3044]	0.1 lb/A	NS	3 (for boll weevil control)	Applications may be made in water or refined vegetable oil. When using water, applications may be made in a minimum of 5 gal/A using ground equipment or 1 gal/A using aerial equipment. One quart of emulsified oil (minimum) may be substituted for one quart of water in aerial applications. When using oil, applications may be made in a minimum of 1 qt/A. Applications may be made alone or as a tank mix with other products approved for use on cotton. The grazing or feeding of cotton forage is prohibited. A 14-day PHI and a 1-day REI have been established. A maximum seasonal rate of 0.6 lb ai/A is in effect.
Foliar broadcast application Ground, sprinkler irrigation, or aerial equipment	38.7% WP [279-3084]	0.1 lb/A	NS	3 (for boll weevil control)	Applications may be made in water only in a minimum of 5 gal/A using ground or aerial equipment. The grazing or feeding of cotton forage is prohibited. A 14-day PHI and a 1-day REI have been established. A maximum seasonal rate of 0.6 lb ai/A is in effect.

Table A (continued).

Site Application Type Application Timing Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Appl. Rate (ai)	Maximum Number of Applications	Minimum Retreatment Interval (Days)	Use Limitations ¹
Cotton (continued)					
Soil broadcast, band, or in-furrow spray application Preplant to crop emergence Ground or aerial equipment	38.7% WP [279-3084] 2.5 lb/gal EC [279-3027] [279-3046] [AL940008] [LA940002] [MS940004] [SC950008] 2.5 lb/gal SC/L [279-3044]	0.1 lb/A	NS	NS	Applications may be made in a minimum of 1 gal/A by air (5 gal/A by air for the 38.7% WP formulation). The grazing or feeding of cotton forage is prohibited. A 14-day PHI has been established. A maximum seasonal rate of 0.6 lb ai/A is in effect.
Head and stem Brassica sub group					
Foliar broadcast application Ground or aerial equipment	38.7% WP [279-3084] 2.5 lb/gal EC [279-3027]	0.1 lb/A	NS	7	Applications may be made in a minimum of 15 gal/A using ground equipment or 5 gal/A using aerial equipment. A 1-day PHI and a 1-day REI have been established. A maximum seasonal rate of 0.6 lb ai/A is in effect.
Leafy Brassica Greens sub group					
Foliar broadcast application Ground or aerial equipment	38.7% WP [279-3084] 2.5 lb/gal EC [279-3027]	0.1 lb/A	NS	7	Applications may be made in a minimum of 15 gal/A using ground equipment or 5 gal/A using aerial equipment. A 1-day PHI and a 1-day REI have been established. A maximum seasonal rate of 0.4 lb ai/A is in effect.

Table A (continued).

Site Application Type Application Timing Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Appl. Rate (ai)	Maximum Number of Applications	Minimum Retreatment Interval (Days)	Use Limitations ¹
Lettuce, head					
Foliar broadcast application Ground or aerial equipment	38.7% WP [279-3084] 2.5 lb/gal EC [279-3027]	0.1 lb/A	NS	NS	Applications may be made in a minimum of 15 gal/A using ground equipment or 5 gal/A using aerial equipment. A 5-day PHI and a 1-day REI have been established. A maximum seasonal rate of 0.6 lb ai/A is in effect.
Onion, bulb (including garlic and shallots)					
Foliar broadcast application Ground or aerial equipment	38.7% WP [279-3084] 2.5 lb/gal EC [279-3027]	0.1 lb/A	NS	NS	Applications may be made in a minimum of 20 gal/A using ground equipment or 3 gal/A using aerial equipment. The grazing of livestock in treated areas or cutting of treated crops for feed is prohibited. A 7-day PHI and a 1-day REI have been established. A maximum seasonal rate of 0.5 lb ai/A is in effect.
Pecans					
Foliar broadcast application Pre-shuck split Ground equipment	38.7% WP [279-3084] 2.5 lb/gal EC [279-3027] [NM860002]	0.1 lb/A	NS	NS	Ground applications may be made to the point of drip; 100 gal/A for smaller trees and 200 to 300 gal/A for larger trees. The grazing of livestock in treated orchards or cutting of treated cover crops for feed is prohibited. A 21-day PHI has been established. A maximum seasonal rate of 0.6 lb ai/A is in effect; for SLN No. NM860002, a maximum seasonal rate of 0.8 lb ai/A is in effect.

Table A (continued).

Site Application Type Application Timing Application Equipment	Formulation [EPA Reg. No.]	Maximum Single Appl. Rate (ai)	Maximum Number of Applications	Minimum Retreatment Interval (Days)	Use Limitations ¹
Food-Handling Establishments					
Spot or crack/crevice application Brush or spray equipment	35.6% WP [279-3085] [10182-100] 40% WP [279-3070] [10182-71] 50% WP [279-3109] [279-3117] 2 lb/gal EC [279-3081] [279-3082] [10182-105] 2.5 lb/gal EC [279-3120] 3 lb/gal EC [10182-106]	0.2%	NS	Not applicable (NA)	Application is allowed in non-food areas of food-handling establishments (other than private residences) in which food is held, processed, prepared or served. Use in food areas of food handling establishments, restaurants or other areas where food is commercially prepared is prohibited. The label prohibits use in serving areas while food is exposed or facility is in operation. The label specifies that in the home all food processing surfaces and utensils should be covered during treatment or thoroughly washed before use; exposed food should be covered or removed. Application in warehouses where raw or cured tobacco is stored, or while raw agricultural commodities for food or feed are being stored is prohibited. Applications may be repeated as necessary.
Spot or crack/crevice application Brush or spray equipment	3 lb/gal EC [10182-108]	0.1%	NS	NA	Applications may be repeated as necessary.

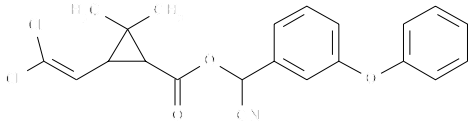
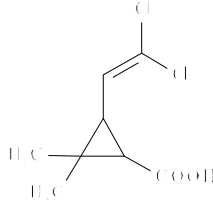
1. REI = Reentry interval and PHI = Preharvest interval. Rotational crops may be planted 30 days after the last application of the 2.5 lb/gal EC (EPA Reg. Nos. 279-3027 and 279-3046), 2.5 lb/gal SC/L (EPA Reg. No. 279-3044), or 38.7% WP (EPA Reg. No. 279-3084) formulations.

OPPTS.GLN 860.1300: Nature of the Residue - Plants

The qualitative nature of the residue in plants is adequately understood based on acceptable plant metabolism studies with lettuce, corn, and cotton plants. These studies identified several metabolites at varying concentrations. The main route of metabolism is hydrolysis of the ester linkage and further oxidation of the alcohol and acid hydrolysates.

The Metabolism Assessment Review Committee (MARC) determined that the residue of concern for enforcement and dietary risk assessment purposes is zeta-cypermethrin plus the four inactive R-isomers in plants, livestock, and drinking water (D269584, Y. Donovan, 03-NOV-2000). Thus, the current tolerance expression for plants is adequate. Also, the MARC determined that the residues of the metabolite dichlorovinyl acid (DCVA) (cis and trans) need not be included in the tolerance expression or risk assessment for cypermethrin and zeta-cypermethrin. This determination was based on the observation that in the majority of crops, parent compound accounts for at least 90% of the total residue. In those crops where DCVA was found >10%, either the detected DCVA levels were below the LOQ or the maximum animal dietary burden contributions from DCVA for these commodities were about equal to or less than the LOQ. Thus, this decision regarding DCVA is limited to cypermethrin and zeta-cypermethrin only as toxicity concerns for DCVA remain. Other pyrethroid insecticides which generate DCVA should be examined individually with respect to DCVA regulation. Regulation of the parent only is consistent with CODEX and eases enforcement, since DCVA is not recovered by the multi-residue enforcement methods. The chemical structures of cypermethrin and DCVA are depicted in Figure A.

Figure A. Chemical structures of cypermethrin and DCVA.

Compound: Chemical name	Compound: Chemical name
 Cypermethrin [(±)-alpha-cyano-(3-phenoxyphenyl)methyl [(±)-cis, trans-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane-carboxylate]]	 DCVA: 1-(RS)-cis-trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylic acid

OPPTS.GLN 860.1300: Nature of the Residue - Livestock

The qualitative nature of the residue in ruminants and poultry is adequately understood. The HED MARC has determined that the residue to be regulated in livestock commodities is cypermethrin *per se*; thus, the current tolerance expression for livestock commodities is appropriate.

The major metabolites identified in tissues, milk, and eggs following oral administration of [cyclopropyl-¹⁴C]cypermethrin were nonconjugated *cis*- and *trans*-DCVA and cypermethrin. The proposed major route of cypermethrin metabolism in livestock is via hydrolysis of the ester linkage. Hydrolysis of the benzyl-labelled cypermethrin and/or its hydroxylated metabolites gives initially the unstable cyanohydrin which rapidly breaks down to 3-phenoxybenzaldehyde and is oxidized to the corresponding acid/or hydroxylated acids. A very minor route was observed in which a small amount of the aldehyde was converted to its corresponding alcohol.

OPPTS.GLN 860.1340: Residue Analytical Methods - Plants and Livestock

No additional information regarding residue analytical methods is required. The Pesticide Analytical Manual (PAM) Volume II lists Methods I and II as available for the determination of residues of cypermethrin *per se* in/on plant and livestock commodities, respectively. Both are GLC methods with electron capture detection and have undergone successful Agency method tryout. Method I has a detection limit of 0.01 ppm, and Method II has detection limits of 0.005 ppm for milk and 0.01 ppm for livestock tissues. These methods are not stereospecific; thus no distinction is made between residues of cypermethrin (all eight stereoisomers) and zeta-cypermethrin (an enriched isomer form of cypermethrin).

Revised versions of the livestock methods which are capable of determining cypermethrin and DCVA were recently validated by an independent laboratory. Adequate recoveries were obtained by the laboratory. The revised methods were also subjected to a successful radiovalidation. Methods for determination of DCVA are available in PAM Volume II in the section for permethrin.

Multiresidue method(s): The 1/94 FDA PESTDATA database indicates that residues of cypermethrin are completely recovered (>80%) using multiresidue method Sections 302 (Luke), 303 (Mills, Onley, and Gaither) and 304 (Mills fatty food). Although the DCVA metabolites have not been tested through FDA multiresidue methods, the recovery of these metabolites has been shown to be unlikely.

OPPTS.GLN 860.1380: Storage Stability Data

Adequate storage stability data are available to validate the maximum storage conditions and intervals of raw agricultural plant commodity samples used for tolerance establishment. Additional

storage stability data are required for cottonseed processed products (for a minimum interval of 9 months). Adequate data are also available for residues in milk, eggs, and livestock tissues.

The existing storage stability data indicate that fortified residues of cypermethrin are stable under frozen storage conditions for at least three months in ruminant liver and milk; six months in poultry muscle, liver, and eggs; 12 months in ruminant muscle and fat; 18 months in/on apples, soybeans, and tomatoes; 30 months in broccoli and mustard greens; and 36 months in lettuce.

OPPTS.GLN 860.1500: Crop Field Trials

The reregistration requirements for magnitude of the residue in plants have been evaluated and deemed fulfilled for the following raw agricultural commodities (RACs): bulb and green onions, head lettuce, head and stem Brassica vegetables, leafy Brassica vegetables, pecans, and cottonseed. Overall, acceptable field trials were performed representing the maximum registered use patterns and conditions under which the pesticide could be applied. The geographic representation for each commodity is generally adequate, and a sufficient number of trials reflecting representative formulation classes were conducted.

Cypermethrin is currently registered for use on garlic and shallots. The existing tolerances for residues in/on bulb onions and green onions will cover the registered uses of cypermethrin on garlic and shallots, respectively, as permitted according to 40 CFR §180.1(h).

According to Table 1 of the OPPTS.GLN 860.1500 (8/96), cotton gin byproducts are now recognized as a raw agricultural commodity of cotton. Therefore, field residue data must be submitted for cotton gin byproducts, and a tolerance must be proposed for this commodity when adequate field residue data have been submitted.

OPPTS.GLN 860.1520: Processed Food/Feed

The reregistration requirements for magnitude of the residue in the processed food/feed commodities of cottonseed are fulfilled pending submission of supporting storage stability data. An acceptable cottonseed processing study has been submitted and evaluated. The data from this processing study indicate that residues of cypermethrin *per se* do not concentrate in cottonseed meal, hulls, and refined oil processed from cottonseed bearing detectable residues. Therefore, no separate tolerances are required for residues in cotton processed fractions as the existing tolerance on cottonseed will cover any residues in processed fractions of cotton.

OPPTS.GLN 860.1460: Food-Handling

Several cypermethrin formulations remain registered for use in non-food/feed areas of food-handling establishments and warehouses. Sufficient restrictions are included on the basic producer labels so that exposure to food and feed is unlikely. No additional data are required to support the existing use in non-food/feed areas of food handling establishments.

OPPTS.GLN 860.1480: Meat/Milk/Poultry/Eggs

Ruminants

Residues of cypermethrin can occur directly and indirectly in milk and livestock tissues as a result of the registered uses of the pesticide. Cypermethrin is presently registered for direct livestock treatments such as cattle ear tag uses. Residues of cypermethrin may also occur indirectly in milk and livestock tissues due to registered uses on agricultural crops, some of which may be used as livestock feedstuffs. Because the analytical method does not distinguish between residues of cypermethrin and zeta-cypermethrin, tolerance levels for MMPE commodities should be the same for cypermethrin and zeta-cypermethrin. In light of label restrictions and the different total application rates between formulations containing cypermethrin and zeta-cypermethrin, different tolerance levels may be appropriate for some plants, such as green onions. Thus, taking into account uses of cypermethrin and zeta-cypermethrin, Table 1 presents the calculated theoretical dietary burden for beef and dairy cattle, based on a reasonable diet of livestock feedstuffs that may contain cypermethrin or zeta-cypermethrin residues.

Table 1. Calculated theoretical dietary burdens of cypermethrin and zeta-cypermethrin from various feed commodities for beef and dairy cattle.				
Feed Commodity	Tolerance level (ppm)	% Dry Matter	Beef & Dairy Cattle	
			% of Diet	Acute Anticipated Dietary Burden/Chronic Anticipated Dietary Burden (ppm)
Soybean meal	0.05 ^a	92	15	0.0082
Alfalfa hay	15	89	25	4.21
Corn, sweet, forage	15	48	40	12.5
Rice grain	1.5	88	10	0.17
Aspirated Grain Fraction (AGF)	10	85	10	1.18
Total for diet			100	18.1

^a Taken as soybean, seed tolerance level.

The available ruminant magnitude of residue study has been evaluated and found to be adequate to satisfy ruminant feeding study data requirements. In this study, one group of Holstein dairy cows was fitted with eartags containing cypermethrin (7% by weight) and received gelatin capsules without cypermethrin. Three other groups were fitted with eartags containing cypermethrin and orally dosed with cypermethrin in gelatin capsules equivalent to 5, 15, and 50 ppm in the diet for 28 consecutive days equivalent to ~0.28x, 0.83x, and 2.8x the maximum dietary burden for cattle (18.1 ppm). The residues of cypermethrin found in ruminant milk and tissues are summarized in Table 2.

Table 2. Cypermethrin residues (ppm) in milk and tissues from cows fitted with eartags and dosed daily with cypermethrin at levels equivalent to 5, 15, and 50 ppm in the diet for 28 consecutive days.

Oral Dose ^a (ppm)	Pectoral Muscle	Adductor Muscle	Peritoneal Fat	Subcutaneous Fat	Kidney	Liver	Whole Milk	Milk Cream
0	0.017	ND ^b	0.017	ND	ND	ND	ND	0.010,0.016 (0.013) ^c
5	0.013	ND	0.101,0.150 (0.126)	0.063,0.088 (0.076)	0.012	ND	0.009,0.018 (0.014)	ND
15	0.038,0.079 (0.059)	0.014,0.041 (0.028)	0.444,0.527 (0.486)	0.315,0.462 (0.389)	0.012,0.016 (0.014)	ND	0.045,0.047 (0.046)	0.214,0.314 (0.264)
50	0.104,0.199 (0.152)	0.028,0.041 (0.035)	1.350,1.956 (1.653)	0.737,0.993 (0.865)	0.024,0.070 (0.047)	ND	0.183,0.235 (0.209)	0.663,1.009 (0.836)

^a Livestock in each dose group also were fitted with eartags containing cypermethrin 7% w/w.

^b ND = nondetectable (<0.002 ppm for whole milk samples; <0.010 ppm for tissue and milk cream samples).

^c Average residue in parentheses.

Based on a dietary burden of 18.1 ppm and the results of the bovine feeding study, the maximum theoretical levels of cypermethrin/zeta-cypermethrin in/on beef muscle, fat, kidney, and milk are 0.083, 0.55, 0.017, and 0.049 ppm, respectively. Thus, the appropriate tolerance levels for meat, fat, meat byproducts (of cattle, goat, sheep, and horse) and whole milk are 0.20, 1.0, 0.05, and 0.10 ppm, respectively. The current milk tolerance for zeta-cypermethrin is expressed as follows: “Milk, fat (reflecting 0.10 in whole milk)” at 2.5 ppm. This expression accounts for the concentration of residues in milk fat and is also appropriate for cypermethrin. Note that although a tolerance level of 0.10 ppm could be selected for meat, a level of 0.20 ppm is chosen to achieve harmony with the Codex MRL and the established meat tolerance level for zeta-cypermethrin.

Poultry and Swine

In a similar fashion, the calculated theoretical dietary burden of cypermethrin and zeta-cypermethrin for poultry and swine is presented in Table 3.

Table 3. Calculated theoretical dietary burden of cypermethrin/zeta-cypermethrin for poultry and swine					
Feed Commodity	Tolerance Level (ppm)	Poultry		Swine	
		% Diet	Burden (ppm) ^d	% Diet	Burden (ppm) ^d
Soybean meal	0.05 ^a	20	0.010	20	0.010
Rice grain	1.5	30	0.45	40	0.60
Rice bran	1.5 ^b	20	0.30	15	0.23
Rice hulls	6.0 ^b	10	0.60	0	0
Corn, field, grain	0.010	20	0.002	15	0.0015
AGF	10	0	0	10	1.0
Total		100	1.4	100	1.8

a Taken as soybean, seed tolerance level.

b Taken as rice, grain tolerance level.

Based on a dietary burden of 1.8 ppm and the results of the bovine feeding study, the maximum theoretical levels of cypermethrin/zeta-cypermethrin in/on hog muscle, fat, and kidney are an order of magnitude less than those for cattle: 0.0083, 0.055, and 0.0017 ppm, respectively. Because the LOQ of the analytical method for livestock commodities is 0.05 ppm, the appropriate tolerance levels for hog meat and fat are 0.05 and 0.10 ppm, respectively. No tolerance is needed for hog, meat byproducts due to the low levels predicted for kidney and liver. The “hog, meat byproducts” tolerance of 0.05 ppm for zeta-cypermethrin should be removed.

The available poultry feeding study is adequate to satisfy poultry feeding study data requirements. In the poultry feeding study (Table 4), three groups of hens were dosed orally for 28 consecutive days with cypermethrin at 2, 6, and 20 ppm in the diet, equivalent to 1.4x, 4.3x, and 14.3x the calculated dietary burden (1.4 ppm) for poultry. After Day 7, cypermethrin residues in whole eggs plateaued at <0.005 ppm (nondetectable), 0.009 ppm, and 0.026 ppm for the three respective treatment groups.

Table 4. Residues of cypermethrin (ppm) in eggs and tissues from hens dosed daily with cypermethrin at levels equivalent to 2, 6, and 20 ppm in the diet for 28 consecutive days.

Dose (ppm)	Muscle	Fat	Kidney	Liver	Egg Yolk	Whole Egg
2	NA ^a	ND-0.016 (0.016) ^b	NA	NA	0.009-0.010 (0.009)	ND
6	NA	0.040-0.086 (0.064)	NA	NA	0.029-0.037 (0.033)	0.007-0.010 (0.009)
20	ND ^c	0.134-0.187 (0.164)	ND	ND	0.067-0.100 (0.079)	0.017-0.035 (0.026)

^a Average residue in parentheses.

^b NA = not analyzed.

^c ND = nondetectable (<0.005 ppm for egg samples; <0.010 ppm for tissue samples).

Based on a dietary burden of 1.4 ppm and the results of the poultry feeding study, the maximum theoretical levels of cypermethrin/zeta-cypermethrin in/on poultry muscle, fat, meat byproducts (liver and kidney), and egg are <0.0007, 0.020, <0.0007, and 0.0086 ppm, respectively. Based on this analysis, no tolerances are needed for poultry meat or meat byproducts. However, a tolerance level of 0.05 ppm is appropriate for egg and poultry, fat. Although the present analysis suggest that no tolerance is needed for poultry, meat, setting a level of 0.05 ppm for this commodity would maintain harmony with the Codex MRL and the zeta-cypermethrin tolerance listing. The “poultry, meat byproducts” tolerance of 0.05 ppm for zeta-cypermethrin should be revoked.

OPPTS.GLN 860.1400: Water, Fish, and Irrigated Crops

Cypermethrin is presently not registered for direct use on potable water or aquatic food and feed crops; therefore, no residue chemistry data are required under these guideline topics.

OPPTS.GLNs 860.1850/1900: Confined/Field Accumulation in Rotational Crops

An acceptable confined rotational study has been submitted (MRID 00090064). A limited field rotational crop study (MRID 00098000) has been submitted and deemed adequate by EFGWB to fulfill data requirements for topic OPPTS.GLN 860.1900, but had been found unacceptable in the Phase IV review because the soil had not been analyzed for cypermethrin. The most recent guidance does not require soil analysis, so HED considers the study acceptable. The study indicates that residues of cypermethrin and its metabolites were non-detectable (<0.01 ppm) in/on the rotational crop commodities of leafy vegetables, root and tuber vegetables, and cereal grain crops that were planted 30 days after the soil plots were treated with cypermethrin at 0.5 lb ai/A (~5x the maximum registered single application rate). The submitted study supports the labelled PBI of 30 days and no additional rotational crop data are required for cypermethrin.

Table B. Residue Chemistry Science Assessments for Reregistration of Cypermethrin.

GLN: Data Requirements	Current Tolerances, ppm [40 CFR §180.418]	Must Additional Data Be Submitted?	References ¹
860.1200: Directions for use	N/A = Not Applicable	Yes ²	See Table A
860.1300: Nature of the Residue-Plants	N/A	No	00125658 42876301 ³ 43421301 ³ 43775101 ⁴
860.1300: Nature of the Residue-Livestock	N/A	No	00089014 41899802 ⁵ 42410001 ³ 42876302 ³
860.1340: Residue Analytical Methods			
- Plant Commodities	N/A	No	00090027 00090028 00125658 00127892 40880202
- Livestock Commodities	N/A	No	00081571 43278003 ³ 43775103 ⁴ 43775104 ⁴ 43775105 ⁴ 43775106 ⁴ 43775107 ⁴ 43775108 ⁴
860.1380: Storage Stability Data	N/A	Yes ⁶	92027056 ⁷ 42177001 ⁸ 43578201 ⁹ 43578202 ⁹ 43775109 ⁴ 43775110 ⁴
860.1500: Crop Field Trials			
<u>Bulb Vegetables Group</u>			
- Onions, dry bulb	0.1	No	PP#7F3498 ¹⁰
- Onions, green	6.0	No	43516001 ¹¹
<u>Leafy Vegetables (except Brassica) Group</u>			
- Lettuce, head	10	No ¹²	00125658 00145249 43578203 ⁹
<u>Brassica (Cole) Leafy Vegetables Group</u>			
- Head and stem Brassica	2.0	No	43009701 ¹³ 43578204 ⁹ 43578205 ⁹
- Leafy Brassica	14.0	No	43009702 ¹³ 43578206 ⁹

GLN: Data Requirements	Current Tolerances, ppm [40 CFR §180.418]	Must Additional Data Be Submitted?	References ¹
<u>Tree Nuts Group</u>			
- Pecans	0.05	No	00131670
<u>Miscellaneous Commodities</u>			
- Cottonseed and gin byproducts	0.5 (cottonseed)	Yes ¹⁴	00067376 00081574 00081575 00090027 00090046 00127892 00132000 00132828 40880202 43172001 ¹⁵
860-1520: Processed Food/Feed			
- Cottonseed	--	No	00067377 00090028 00090050 00132828 43270201 ¹⁶
860.1480: Meat/Milk/Poultry/Eggs			
- Milk and the Fat, Meat, and Meat Byproducts of Cattle, Goats, Hogs, Horses, and Sheep	0.05 (milk and the fat, meat, and mbyp of cattle, goats, hogs, horses, and sheep)	No	43278002 ³
- Eggs and the Fat, Meat, and Meat Byproducts of Poultry	None established	No	43278001 ³
860.1400: Water, Fish, and Irrigated Crops			
	N/A	N/A	
860.1460: Food-Handling			
	--	No	
860.1850: Confined Accumulation in Rotational Crops			
	--	No	00090064 ¹⁷
860.1900: Field Accumulation in Rotational Crops			
	--	No	00098000 ¹⁸

¹ **Bolded** references were reviewed in the Cypermethrin Phase 4 Review, 2/11/91, C. Olinger. All other references were reviewed as noted.

² Label amendments are required for cypermethrin EPs with use claims on lettuce, onions, and pecans to specify minimum retreatment intervals. In addition, unless the registrant(s) have field residue data to support aerial applications in <2 gal/A, the product labels must be amended to specify that aerial applications be made in a minimum of 2 gal/A.

The restriction against grazing or feeding cotton forage is impracticable and must be removed from all EP

- 3 CBTS Memorandum, Issues to be Presented to the HED Metabolism Committee, 5/23/95, J. Morales.
- 4 labels with uses on cotton (EPA Reg. Nos. 279-3027, -3084, -3046, and -3044).
CBTS No. 16178, DP Barcode D219045, J. Stokes, 8/07/96.
- 5 CBRS No. 8295, DP Barcode D166726, 10/5/92, C. Olinger.
- 6 The registrant has not completely responded to the storage stability data requirements specified in the
Cypermethrin Phase 4 Review. Data depicting the stability of residues of cypermethrin *per se* are required
for cottonseed processed products, for a minimum interval of 9 months.
- 7 The title of MRID 92027056 indicates that it is a Phase 3 summary of MRID 00071380 regarding
cypermethrin storage stability. However, MRID 00071380 does not pertain to cypermethrin.
- 8 CBRS No. 9592, DP Barcode D175749, 5/20/92, W. Anthony.
- 9 CBTS No. 15355, DP Barcode D213692, J. Stokes, 3/05/96.
- 10 CBTS Nos. 11115 and 11116, D186245, 3/29/93, G. Otakie.
- 11 CBTS No. 15012, DP Barcode D211325, J. Stokes, 2/29/96.
- 12 The available data indicate that the established tolerance for lettuce should be lowered to 4.0 ppm.
- 13 CBTS No. 13023, DP Barcode D197868, G. Kramer, 8/22/94
- 14 Data are required for residues of cypermethrin in/on cotton gin byproducts harvested at normal maturity
from plants treated at the maximum seasonal application rate. Cotton must be harvested by commercial
equipment (stripper and mechanical picker) to provide an adequate representation of plant residue for the
ginning process. A minimum of three field trials for each type of harvesting (stripper and mechanical
picker) are required, for a total of six field trials. An appropriate tolerance for this RAC should be proposed
once acceptable data have been submitted and evaluated.
- 15 CBTS No. 15112, DP Barcode D212111, 6/20/95, J. Stokes.
- 16 CBRS No. 14107, DP Barcode D205958, 10/17/94, F. Fort.
- 17 Reviewed by EFGWB on 4/29/82.
- 18 Reviewed by EFGWB on 5/14/82.

TOLERANCE REASSESSMENT SUMMARY

The tolerances listed in 40 CFR §180.418(a)(1) are expressed in terms of residues of cypermethrin *per se* [(±)-alpha-cyano-(3-phenoxyphenyl)methyl [(±)-*cis, trans*-3(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate]], while those listed in 40 CFR §180.418(a)(2) are expressed in terms of residues of zeta-cypermethrin [(S-cyano-(3-phenoxyphenyl)methyl [(±)-*cis, trans*-3(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate]] and its inactive R-isomers. The HED MARC has determined that the current tolerance expression for plant and livestock commodities is appropriate. Because the analytical enforcement method does not distinguish between cypermethrin and zeta-cypermethrin, all tolerance levels for livestock commodities should be the same for the racemic and enriched isomers. In light of label restrictions and the different total application rates between formulations containing cypermethrin and zeta-cypermethrin, different tolerance levels may be appropriate for some plants, such as green onions.

Tolerances Listed Under 40 CFR §180.418(a)(1):

Plant commodity tolerances: Sufficient field trial data are available to ascertain the adequacy of the established tolerances listed in 40 CFR §180.418 for the following plant commodities: head and stem Brassica subgroup; leafy greens Brassica subgroup; undelinted cottonseed; head lettuce; bulb onion; green onion; and pecans. For the purposes of tolerance reassessment, the existing field trial data for these RACs have been re-evaluated. With the exception of head lettuce, the data suggest that the existing tolerance levels for all plant commodities are appropriate, and no increase or decrease in levels are warranted. Based on acceptable field trial data for head lettuce, the established tolerance for this commodity should be lowered from 10 ppm to 4.0 ppm. The available data indicate that the maximum residue of cypermethrin found in head lettuce following applications of a representative cypermethrin formulation, according to the maximum registered patterns, was 3.4 ppm.

Although a tolerance for garlic has not been established, the existing tolerance for bulb onions will cover the registered uses of cypermethrin on garlic, as permitted according to 40 CFR §180.1(h).

Livestock commodity tolerances: An acceptable ruminant feeding study is available to ascertain the adequacy of the established tolerances listed in 40 CFR §180.418(a)(1) for the following livestock commodities: meat, fat, and meat byproducts of cattle, goats, hogs, horses and sheep. Also, an acceptable poultry feeding study is available to determine the need for tolerances in/on poultry commodities.

Tolerances That Need To Be Proposed Under 40 CFR §180.418(a)(1):

Table I of OPPTS Series 860.1000 (issued 8/96) now recognizes cotton gin byproducts as a raw agricultural commodity of cotton. Therefore, field residue data should be submitted for cotton gin byproducts and a tolerance should be proposed for this commodity when adequate field residue data have been submitted and evaluated. Based on the poultry feeding study and dietary burden and Codex considerations, HED recommends that a tolerance level of 0.05 ppm be established for cypermethrin residues in/on egg; poultry, fat; and poultry, meat.

Tolerances That Need To Be Changed Under 40 CFR §180.418(a)(2):

As discussed previously, tolerance levels for livestock commodities should be the same for cypermethrin and zeta-cypermethrin. Comparison of the dietary burden calculated for swine shows that it is approximately 10x lower than that for cattle. Accordingly, lower tolerance levels are appropriate for hog commodities. Thus, the present data supports the following changes to hog tolerances: 1) reduce the current tolerance level of 1.0 ppm for hog, fat to 0.10 ppm, 2) reduce the current tolerance level of 0.2 ppm for hog, meat to 0.05 ppm, and 3) remove the current tolerance level of 0.05 ppm for hog, meat byproducts. In addition, the current tolerance level of 10.00 ppm for lettuce, head may be removed since this RAC is already included in the crop group 4 listing. Finally, the poultry, meat byproducts tolerance level of 0.05 ppm should be removed as the present analysis shows expected residues to be so low that a tolerance is not necessary [40 CFR §180.6(a)(3)].

A summary of cypermethrin tolerance reassessments is presented in Table C.

Table C. Tolerance Reassessment Summary for Cypermethrin.

Commodity	Current Tolerance (ppm)	Tolerance Reassessment (ppm)	Comment/ <i>Correct Commodity Definition</i>
Tolerances listed under 40 CFR 180.418(a)(1):			
Brassica, head and stem	2.0	2.0	[<i>Brassica, head and stem, subgroup</i>]
Brassica, leafy	14.0	14.0	[<i>Brassica, leafy greens, subgroup</i>]
Cattle, fat	0.05	1.0	
Cattle, meat	0.05	0.20	Harmonizes with Codex MRL
Cattle, mbyp	0.05	0.05	[<i>Cattle, meat byproducts</i>]
Cottonseed	0.5	0.50	[<i>Cotton, undelinted seed</i>]
Goats, fat	0.05	1.0	[<i>Goat, fat</i>]
Goats, meat	0.05	0.20	[<i>Goat, meat</i>]
Goats, mbyp	0.05	0.05	[<i>Goat, meat byproducts</i>]
Hogs, fat	0.05	0.10	[<i>Hog, fat</i>]
Hogs, meat	0.05	0.05	[<i>Hog, meat</i>]

Commodity	Current Tolerance (ppm)	Tolerance Reassessment (ppm)	Comment/ <i>Correct Commodity Definition</i>
Hogs, mbyop	0.05	—	Residue data support removal of tolerance.
Horses, fat	0.05	1.0	<i>[Horse, fat]</i>
Horses, meat	0.05	0.20	<i>[Horse, meat]</i>
Horses, mbyop	0.05	0.05	<i>[Horse, meat byproducts]</i>
Lettuce, head	10.0	4.0	Residue data support reduction of tolerance.
Milk	0.05	2.5	<i>[Milk, fat (reflecting 0.10 in whole milk)]</i>
Onions, bulb	0.1	0.10	<i>[Onion, bulb]</i>
Onions, green	6.0	6.0	Residue data support a tolerance level of 3.0 ppm for zeta-cypermethrin / <i>[Onion, green]</i>
Pecans	0.05	0.05	
Sheep, fat	0.05	1.0	
Sheep, meat	0.05	0.20	Harmonizes with Codex MRL
Sheep, mbyop	0.05	0.05	<i>[Sheep, meat byproducts]</i>
Tolerances That Need To Be Proposed under 40 CFR 180.418(a)(1):			
Cotton gin byproducts	--	TBD ^a	Data remain outstanding.
Egg	—	0.05	
Poultry, fat	—	0.05	
Poultry, meat	—	0.05	Harmonizes with Codex MRL
Tolerances That Need To Be Changed under 40 CFR 180.418(a)(2):			
Hog, fat	1.0	0.10	Updated dietary burden supports lower tolerance level.
Hog, meat	0.2	0.05	Updated dietary burden supports lower tolerance level.
Hog, meat byproducts	0.05	None	Updated dietary burden removes need for tolerance level.
Lettuce, head	10.00	None	Covered by Vegetable, leafy, except Brassica, group 04
Poultry, meat byproducts	0.05	None	Updated dietary burden removes need for tolerance level.

^a TBD = To be determined.

CODEX HARMONIZATION

The Codex Alimentarius Commission has established several maximum residue limits (MRLs) for cypermethrin residues in/on various plant and livestock commodities. The Codex and U.S. tolerances are in harmony with respect to MRL/tolerance expression. Both regulate the parent compound, cypermethrin. A comparison of the Codex MRLs and the corresponding **reassessed** U.S. tolerances is presented in Table D.

Special efforts to increase harmony between recommended US tolerance levels and Codex MRLs were made for the following commodities: 1) poultry, meat (0.05 ppm instead of no tolerance), and 2) meat of cattle, goat, sheep, and horse (0.20 instead of 0.10 ppm). The following conclusions can be made regarding efforts to harmonize the U.S. tolerances with the Codex MRLs with respect to MRL/tolerance level: (i) compatibility between the U.S. tolerances and Codex MRLs exists for bulb onions; meat byproducts; poultry, meat; and meat of cattle, goat, sheep, and horse; and (ii) incompatibility of the U.S. tolerances and Codex MRLs remains for Brassica vegetables, cottonseed, lettuce, milk, and hog commodities, because of differences in good agricultural practices and determination of secondary residue levels in livestock commodities. No questions of compatibility exist with respect to commodities where Codex MRLs have been established but U.S. tolerances do not exist.

Table D. Codex MRLs and applicable U.S. tolerances for cypermethrin. Recommendations for compatibility are based on conclusions following reassessment of U.S. tolerances (see Table C).

Codex		U.S. Tolerance (ppm)	Recommendation And Comments
Commodity (As Defined)	MRL (mg/kg) ¹		
Alfalfa forage (green)	5	--	No registered U.S. uses.
Barley	0.5	--	No registered U.S. uses.
Beans, shelled	0.05 (*)	--	No registered U.S. uses.
Berries and other small fruits	0.5	--	No registered U.S. uses.
Brassica vegetables	1	2.0 14.0	Head and stem Brassica (subgroup 5A) Leafy Brassica greens (subgroup 5B) Compatibility does not exist.
Cherries	1	--	No registered U.S. uses.
Citrus fruits	2	--	No registered U.S. uses.
Coffee beans	0.05 (*)	--	No registered U.S. uses.
Common bean (pods and/or immature seeds)	0.5	--	No registered U.S. uses.
Cucumber	0.2	--	No registered U.S. uses.
Edible offal (mammalian)	0.05 (*)	0.05	Compatibility exists.
Eggplant	0.2	--	No registered U.S. uses.
Eggs	0.05 (*)	0.05	Compatibility exists.
Kale	1	--	No registered U.S. uses.
Leek	0.5	--	No registered U.S. uses.

Table D. *Continued.*

Codex		U.S. Tolerance (ppm)	Recommendation And Comments
Commodity (As Defined)	MRL (mg/kg) ¹		
Lettuce, head	2	10	Compatibility does not exist.
Maize	0.05 (*)	--	No registered U.S. uses.
Maize fodder	5	--	
Meat	0.2	0.20	Compatibility exists.
Milk	0.05	0.10	Compatibility does not exist.
Mushrooms	0.05 (*)	--	No registered U.S. uses.
Nectarine	2	--	No registered U.S. uses.
Oilseed, except peanut	0.2	0.5 (cottonseed)	Cotton is currently the only oil crop with U.S.-registered cypermethrin uses; compatibility does not exist.
Onion, bulb	0.1	0.1	Compatibility exists.
Peach	2	--	No registered U.S. uses.
Peanut	0.05 (*)	--	No registered U.S. uses.
Peas	0.05 (*)	--	No registered U.S. uses.
Peppers	0.5	--	No registered U.S. uses.
Plums (including prunes)	1	--	No registered U.S. uses.
Pome fruits	2	--	No registered U.S. uses.
Poultry meat	0.05 (*)	0.05	Compatibility exists.
Root and tuber vegetables	0.05 (*)	--	No registered U.S. uses.
Sorghum straw and fodder, dry	5	--	No registered U.S. uses.
Soya bean (dry)	0.05 (*)	--	No registered U.S. uses.
Spinach	2	--	No registered U.S. uses.
Sweet corn (corn-on-the-cob)	0.05 (*)	--	No registered U.S. uses.
Tea, green, black	20	--	No registered U.S. uses.
Tomato	0.5	--	No registered U.S. uses.
Vegetable oils, edible	0.5	--	No registered U.S. uses.
Wheat	0.2	--	No registered U.S. uses.
Wheat straw and fodder, dry	5	--	

1. All cypermethrin MRLs are final (CXL) unless otherwise specified. An asterisk (*) signifies that the MRL was established at or about the limit of detection.

AGENCY MEMORANDA RELEVANT TO REREGISTRATION

CB No(s).: 5435, 5436, and 5437
DP Barcode: None
Subject: Cypermethrin on Cotton, Lettuce, and Pecans. EPA Reg. No. 10182-65, 10182-80, and 10182-64. Review of Amended Registration Requests to Lower Total Amount of Applied Active Ingredient.
From: F. Griffith
To: G. LaRocca
Dated: 7/18/89
MRID(s): No MRID Number

CB No(s).: 6936
DP Barcode: None
Subject: PP# 9H5571. Cypermethrin (Demon) for Use in Food Handling Establishments. Amendment Dated 8/1/90.
From: B. Schneider
To: G. LaRocca/A. Heyward
Dated: 11/16/90
MRID(s): No MRID Number

CBRS No(s).: 8458, 8459, and 8460
DP Barcode: D167568, D167576, and D167579
Subject: I.D. Nos. 279-GREA, 279-GREL, and 279-GREU. Registration Application for Use of S-cypermethrin on Cotton, Lettuce, and Pecans. Chemical No. 129064.
From: B. Cropp-Kohlligian
To: G. LaRocca
Dated: 3/20/92
MRID(s): None

CBTS No(s).: 8092
DP Barcode: D165012
Subject: PP# 1F3994 Cypermethrin for Use in/on Sunflowers. Evaluation of Analytical Method and Residue Data.
From: G. Herndon
To: G. LaRocca/A. Heyward
Dated: 9/18/91
MRID(s): 41892600-41892605

CBRS No(s).: 9592
DP Barcode: D175749
Subject: ID#: 109702-000279. Cypermethrin: FMC Response to Phase IV Storage Stability Review of Lettuce and Tomatoes.
From: W. Anthony
To: V. Eagle
Dated: 5/20/92
MRID(s): 42177001

CBTS No(s).: 6984
DP Barcode: D155247
Subject: PP# 0F3863: EPA Reg. Nos. 279-3027 and 279-3084. Cypermethrin (Ammo) on Peanuts. Evaluation of Analytical Methods and Residue Data.
From: J. Garbus
To: G. LaRocca/T. LeMaster and A. Kocialski
Dated: 7/28/92
MRID(s): 41470901-41470906

CBRS No.: 8295
DP Barcode: D166726
Subject: ICI Americas Response to the Phase IV DCI: Poultry Metabolism Study; Chemical No. 109702.
From: C. Olinger
To: V. Dutch
Dated: 10/5/92
MRID(s): 41899802

CBTS No(s).: 6644 and 6645
DP Barcode: None
Subject: PP# 9F3815/9H5590, Cypermethrin (Ammo 2.5 EC & Ammo WSB, EPA Reg. Nos. 279-3027, 279-3084) in/on Sugar Beets. Evaluation of Residue Data and Analytical Methodology.
From: J. Garbus
To: G. LaRocca
Dated: 10/22/92
MRID(s): 41274701, 41274702, and 41390200-41390202

CBTS No(s).: 11115 and 11116
DP Barcode: D186245
Subject: PP# 7F3498 and PP# 4F3011 - Cypermethrin on Bulb Onions and Cabbage - Updated Evaluation of Previous CBTS Recommendations.
From: G. Otakie
To: G. LaRocca/T. LeMaster

Dated: 3/29/93
MRID(s): None

CBTS No(s).: 9478 and 9479
DP Barcode: D174790 and D174837
Subject: PP# 2F4079/2H5627: Cypermethrin (Ammo 2.5, Ammo Oil, and Ammo WSB, EPA Reg. Nos. 279-3027, 279-3044, and 279-3084) in/on Grain Sorghum and Grain Sorghum RACs. Evaluation of Residue Data and Analytical Methodology.

From: J. Garbus
To: T. LeMaster/G. LaRocca
Dated: 4/6/93
MRID(s): 42169901-42169903 and 42201701-42201704

CBTS No(s).: 9503 and 9504
DP Barcode: D175233 and D175238
Subject: PP# 2F4103/2H5631: Cypermethrin (Ammo 2.5 EC and Ammo WSB, EPA Reg. Nos. 279-3027 and 279-3084) in/on Tomatoes and Tomato Processed Commodities. Evaluation of Residue Data and Analytical Methodology.

From: J. Garbus
To: A. Heyward/G. LaRocca
Dated: 9/14/93
MRID(s): 42222801-42222804

CBTS No.: 13023
DP Barcode: D197868
Subject: PP# 4F04291. Cypermethrin in or on Brassica Leafy Vegetable Group. Evaluation of Residue Data and Analytical Methods.

From: G. Kramer
To: G. LaRocca
Dated: 8/18/94
MRID(s): 43009701 and 43009702

CBRS No.: 14107
DP Barcode: D205958
Subject: Cypermethrin. Case No. 2130. Chemical I.D. No. 109702. Addendum to Cotton Processing Study.

From: F. Fort
To: V. Dutch/B. Briscoe
Dated: 10/17/94
MRID(s): 43270201

CBRS No.: None
DP Barcode: None
Subject: Cypermethrin. Issues to be presented to the HED Metabolism Committee on 5/25/95.
From: J. Morales
To: Metabolism Committee
Dated: 5/23/95
MRID: 42410001, 42876301, 43421301, 42876302, 43278001, and 43278002

CBTS No.: 15112
DP Barcode: D212111
Subject: ID# 000279-03027. Cypermethrin. Label Amendment For In-Furrow Use On Cotton.
From: J. Stokes
To: G. LaRocca/A. Heyward
Dated: 6/20/95
MRID: 43172001

CBRS No.: 16183
DP Barcode: D219212
Subject: The Metabolism Committee Meeting Held on 5/25/95. Cypermethrin Metabolism in Plants and Animals
From: J. Morales
To: Metabolism Committee
Dated: 9/15/95
MRID: None

CBTS No.: 15012
DP Barcode: D211325
Subject: PP#5E4463. Cypermethrin In/On Green Onions. Evaluation of Analytical Methodology and Residue Data.
From: J. Stokes
To: Hoyt Jamerson
Dated: 02/29/96
MRID: 43516001

CBTS No.: 15355
DP Barcode: D213692
Subject: PP#4F4291. Cypermethrin In/On the Brassica Leafy Vegetable Group.
Amendment Dated March 3, 1995
From: J. Stokes
To: George LaRocca/Adam Heyward
Dated: 03/05/96
MRID: 43578200 through 43578206

CBTS No.: 16719
DP Barcode: D221661
Subject: PP#4F3012. Cypermethrin In/On the Sweet Corn (K+CWHR)and
Forage/Fodder. Amendment Dated November 3, 1995.
From: J. Stokes
To: D. McCall
Dated: 03/12/96
MRID: 43841300, 43841301, and 43841302.

CBTS No.: 14280 and 16816
DP Barcode: D206793 and D222640
Subject: PP#4F4399 Cypermethrin In/On Alfalfa. Evaluation of Analytical Methodology
and Residue Data; Zeta-Cypermethrin In/On Alfalfa. Evaluation of Analytical
Methodology and Residue Data
From: J. Stokes
To: D. McCall
Dated: 05/08/96
MRID: 43328401 through 43328403; 43899401 and 43899402

CBTS No.: 16534
DP Barcode: D220937
Subject: PP#7E03487 - Cypermethrin in/on Clover (Seed Production) - Evaluation of
Amendments.
From: G. Otakie
To: D. McCall
Dated: 5/9/96
MRID: None

CBTS No.: 16178
DP Barcode: D219045
Subject: PP#2F4079/2H5627: Cypermethrin in/on Grain Sorghum. Amendment dated
August 25, 1995.
From: J. Stokes
To: D. McCall

Dated: 08/07/96
MRID: 437751-01 through -10
CBTS No.: 17538
DP Barcode: D229378
Subject: Beta-cypermethrin Pre-Registration Meeting of April 23, 1996, Minutes of Meeting. ID# 288063
From: E. Haeberer
To: D. McCall
Dated: 09/12/96
MRID: None

CBTS No.: 17515
DP Barcode: D229390
Subject: Reregistration of Cypermethrin: Meat, Milk, Poultry, and Eggs.
From: C. Olinger
To: M. Clock/P. Deschamp
Dated: 09/12/96
MRID: None

MASTER RECORD IDENTIFICATION NUMBERS

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